

# Appendix C

## Basic Reports: Examples and Descriptions

This Appendix shows examples of the verification and summary reports printed by the DOE-2 LOADS, SYSTEMS, PLANT and ECONOMICS sub-programs. A description of the contents of each summary report and selected verification reports is given. The corresponding input for these reports can be found in the *Sample Run Book (2.1E)* for the building indicated in the first line of the report title.

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# **REPORT LV-A** **GENERAL PROJECT AND BUILDING INPUT**

SIMPLE STRUCTURE RUN 3, CHICAGO  
 DESIGN-DAY SIZING OF VAV SYSTEM  
 REPORT- LV-A GENERAL PROJECT AND BUILDING INPUT

DIVIDE INTO ZONES; ADD PLENUM  
 SHOW ALL REPORTS

DOE-2.1E-801 Thu Nov 4 15:19:02 1993LDL RUN 3

WEATHER FILE- TRY CHICAGO

## **PERIOD OF STUDY**

STARTING DATE	ENDING DATE	NUMBER OF DAYS
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3 AUG 1974	5 AUG 1974	3
5 JAN 1974	7 JAN 1974	3
6 APR 1974	8 APR 1974	3
1 JAN 1974	31 DEC 1974	365

## **SITE CHARACTERISTIC DATA**

STATION NAME	LATITUDE (DEG)	LONGITUDE (DEG)	ALTITUDE (FT)	TIME ZONE	BUILDING AZIMUTH (DEG)
TRY CHICAGO	42.0	88.0	610.	6 CST	30.0

# REPORT LV-D

## DETAILS OF EXTERIOR SURFACES IN THE PROJECT

SIMPLE STRUCTURE RUN 3, CHICAGO  
DESIGN-DAY SIZING OF VAV SYSTEM  
REPORT- LV-D DETAILS OF EXTERIOR SURFACES IN THE PROJECT

DIVIDE INTO ZONES; ADD PLENUM  
SHOW ALL REPORTS

DOE-2.1E-001 Thu Nov 4 15:19:02 1993LAL RUN 3

WEATHER FILE- TRY CHICAGO

NUMBER OF EXTERIOR SURFACES 9 RECTANGULAR 9 OTHER 0  
(U-VALUE INCLUDES OUTSIDE AIR FILM; WINDOW INCLUDES FRAME, IF DEFINED)

SURFACE	SPACE	--- WINDOWS ---		--- WALL ---		--- WALL + WINDOWS ---		AZIMUTH
		U-VALUE (BTU/HR-SQFT-F)	AREA (SQFT)	U-VALUE (BTU/HR-SQFT-F)	AREA (SQFT)	U-VALUE (BTU/HR-SQFT-F)	AREA (SQFT)	
WALL-1PB	PLENUM-1	0.000	0.00	0.067	200.00	0.067	200.00	NORTH
BACK-1	SPACE3-1	0.565	229.00	0.067	571.00	0.210	800.00	NORTH
RIGHT-1	SPACE2-1	0.467	100.00	0.067	300.00	0.167	400.00	EAST
WALL-1PR	PLENUM-1	0.000	0.00	0.067	100.00	0.067	100.00	EAST
WALL-1PF	PLENUM-1	0.000	0.00	0.067	200.00	0.067	200.00	SOUTH
FRONT-1	SPACE1-1	0.587	244.00	0.067	556.00	0.226	800.00	SOUTH
WALL-1PL	PLENUM-1	0.000	0.00	0.067	100.00	0.067	100.00	WEST
LEFT-1	SPACE4-1	0.467	100.00	0.067	300.00	0.167	400.00	WEST
TOP-1	PLENUM-1	0.000	0.00	0.168	5000.00	0.168	5000.00	ROOF
F1-1	SPACE1-1	0.000	0.00	0.050	1056.00	0.050	1056.00	UNDERGRND
F2-1	SPACE2-1	0.000	0.00	0.050	456.00	0.050	456.00	UNDERGRND
F3-1	SPACE3-1	0.000	0.00	0.050	1056.00	0.050	1056.00	UNDERGRND
F4-1	SPACE4-1	0.000	0.00	0.050	456.00	0.050	456.00	UNDERGRND
F5-1	SPACE5-1	0.000	0.00	0.050	1976.00	0.050	1976.00	UNDERGRND

SIMPLE STRUCTURE RUN 3, CHICAGO  
 DESIGN-DAY SIZING OF VAV SYSTEM  
 REPORT- LV-D DETAILS OF EXTERIOR SURFACES IN THE PROJECT

DIVIDE INTO ZONES; ADD PLENUM  
 SHOW ALL REPORTS

DOE-2.1E-001 Thu Nov 4 15:19:02 1993LCL RUN 3

WEATHER FILE- TRY CHICAGO  
 (CONTINUED)

	AVERAGE U-VALUE/WINDOWS (BTU/HR-SQFT-F)	AVERAGE U-VALUE/WALLS (BTU/HR-SQFT-F)	AVERAGE U-VALUE WALLS+WINDOWS (BTU/HR-SQFT-F)	WINDOW AREA (SQFT)	WALL AREA (SQFT)	WINDOW+WALL AREA (SQFT)
NORTH	0.565	0.067	0.181	229.00	771.00	1000.00
EAST	0.467	0.067	0.147	100.00	400.00	500.00
SOUTH	0.587	0.067	0.194	244.00	756.00	1000.00
WEST	0.467	0.067	0.147	100.00	400.00	500.00
ROOF	0.000	0.168	0.168	0.00	5000.00	5000.00
ALL WALLS	0.544	0.067	0.174	673.00	2327.00	3000.00
WALLS+ROOFS	0.544	0.136	0.170	673.00	7327.00	8000.00
UNDERGRND	0.000	0.050	0.050	0.00	5000.00	5000.00
BUILDING	0.544	0.101	0.124	673.00	12327.00	13000.00

## REPORT LS-B

### SPACE PEAK LOAD COMPONENTS

This report gives a breakdown of cooling and heating peak loads, according to the source of the load, for each space. A "load" here is defined as the amount of heat that must be added or removed from the space air per hour to maintain a *constant* air temperature equal to the TEMPERATURE keyword value in SPACE-CONDITIONS. These loads are modified in the SYSTEMS program to account for time-varying air temperatures.

1. WALL CONDUCTION

is the load due to conduction through exterior walls ( $TILT \geq 45^\circ$ ).

2. ROOF CONDUCTION

is the load due to conduction through roof sections (exterior walls with  $TILT < 45^\circ$ ).

3. WINDOW GLASS+FRM COND

is the load due to  $UA\Delta T$  heat gain through all the exterior windows (glass plus frames) plus solar energy absorbed by the glass and frames and conducted into the space.

4. WINDOW GLASS SOLAR

is the load caused by direct and diffuse solar radiation transmitted by the window glass into the space. Note that all sensible loads are calculated as *delayed in time with weighting factors* so that it is possible to have load contributions from WINDOW GLASS SOLAR at night.

5. DOOR CONDUCTION

is the load due to conduction through external doors in the space.

6. INTERNAL SURFACE COND

is the load due to conduction through INTERIOR-WALLS such as partitions and drop ceilings. These loads will be zero in this report if you choose the same LOADS calculation temperature for all spaces.

7. UNDERGROUND SURF COND

is the load due to conduction through basement floors and walls or slabs on grade.

8. The next five entries are the loads due to

*occupants*

(resulting from user-supplied entries for keywords PEOPLE-SCHEDULE, NUMBER-OF-PEOPLE, AREA-PERSON, and PEOPLE-HEAT-GAIN),

*electric lighting*

(keywords LIGHTING-SCHEDULE, LIGHTING-TYPE, LIGHTING-W/SQFT, TASK-LT-W/SQFT, etc.),

*equipment*

(keywords EQUIP-SCHEDULE, EQUIPMENT-W/SQFT, etc.),

*process*

(keywords SOURCE-SCHEDULE, SOURCE-TYPE, SOURCE-BTU/HR, etc.), and

*infiltration of outside air*

(keywords INF-SCHEDULE, INF-METHOD, AIR-CHANGES/HR, etc.).

9. The RUN number in the upper right hand corner refers to the number of the pass through the LOADS program. For example, if you were doing parametric runs as part of the same job, successive passes through LOADS would be recorded as RUN 1, RUN 2, RUN 3, etc.

AMPLE STRUCTURE RUN 3. CHICAGO  
DESIGN-DAY SIZING OF VAV SYSTEM  
REPORT- LS-B SPACE PEAK LOAD COMPONENTS

DIVIDE INTO ZONES; ADD PLENUM  
SHOW ALL REPORTS

DOE-2.1E-001 Thu Nov 4 15:19:02 1993LCL RUN 3

SPACE1-1

WEATHER FILE- TRY CHICAGO

SPACE SPACE1-1

MULTIPLIER	1.0	FLOOR MULTIPLIER	1.0
FLOOR AREA	1056 SQFT	98 M2	
VOLUME	8448 CUFT	239 M3	

	COOLING LOAD		HEATING LOAD	
TIME	NOV 8 3PM		JAN 12 8AM	
DRY-BULB TEMP	60F	16C	-7F	-22C
WET-BULB TEMP	49F	9C	-7F	-22C

	SENSIBLE		LATENT		SENSIBLE	
	(KBTU/H)	( KW )	(KBTU/H)	( KW )	(KBTU/H)	( KW )
WALL CONDUCTION	1.700	0.498	0.000	0.000	-2.726	-0.799
ROOF CONDUCTION	0.000	0.000	0.000	0.000	0.000	0.000
WINDOW GLASS-FRM COND	1.936	0.567	0.000	0.000	-9.976	-2.923
WINDOW GLASS SOLAR	22.696	6.650	0.000	0.000	0.775	0.227
DOOR CONDUCTION	0.000	0.000	0.000	0.000	0.000	0.000
INTERNAL SURFACE COND	0.000	0.000	0.000	0.000	0.000	0.000
UNDERGROUND SURF COND	-0.950	-0.278	0.000	0.000	-1.584	-0.464
OCCUPANTS TO SPACE	2.335	0.684	1.433	0.420	0.120	0.035
LIGHT TO SPACE	3.598	1.054	0.000	0.000	0.464	0.136
EQUIPMENT TO SPACE	2.538	0.744	0.000	0.000	0.188	0.055
PROCESS TO SPACE	0.000	0.000	0.000	0.000	0.000	0.000
INFILTRATION	-0.136	-0.040	0.000	0.000	-1.689	-0.495
TOTAL	33.718	9.879	1.433	0.420	-14.429	-4.228
TOTAL LOAD	35.151 KBTU/H	10.299 KW			-14.429 KBTU/H	-4.228 KW
TOTAL LOAD / AREA	33.29BTU/H.SQFT	104.981 W / M2			13.664BTU/H.SQFT	43.093 W / M2

NOTE 1) THE ABOVE LOADS EXCLUDE OUTSIDE VENTILATION AIR LOADS  
2) TIMES GIVEN IN STANDARD TIME FOR THE LOCATION IN CONSIDERATION

## REPORT LS-C

### BUILDING PEAK LOAD COMPONENTS

This report is similar in format to LS-B. The major difference is that LS-C is generated at the "building level", i.e., the space loads are summed each hour to give the building coincident load and the peak values of this load are shown here.

"Floor area" in this report is that of conditioned spaces only (ZONE-TYPE=CONDITIONED); it *excludes* plenums and other unconditioned spaces (ZONE-TYPE=PLENUM or UNCONDITIONED). "Volume" is that of conditioned spaces and plenums; it *excludes* ZONE-TYPE = UNCONDITIONED.

The building coincident peak load does not include plenums (ZONE-TYPE=PLENUM) or other unconditioned spaces (ZONE-TYPE=UNCONDITIONED).

Although no infiltration is indicated for the peak cooling load in this example, the user should realize how DOE-2 treats infiltration loads. The sensible portion is treated as an instantaneous heat gain or loss. The latent portion is reported in LOADS, but is passed to SYSTEMS as a CFM with the calculated humidity ratio for each hour. The contribution of the latent heat (negative or positive in relation to room humidity) is then calculated from a mass balance of moisture in the space, to determine the return air humidity ratio. In dry climates the infiltration may actually result in a decreased space latent load and thus a decreased total SYSTEMS load. The opposite is true in humid climates where infiltration acts to increase the SYSTEMS load.

The heat gain or loss that occurs in plenums, including heat due to lights, is accounted for in the SYSTEMS simulation and causes a temperature change in the return air flowing through the plenum. Therefore, you should not specify plenums unless they are actually return air plenums. Unconditioned, non-return-air spaces should be specified in the SPACE command with ZONE-TYPE = UNCONDITIONED.

SIMPLE STRUCTURE RUN 3, CHICAGO  
 DESIGN-DAY SIZING OF VAV SYSTEM  
 REPORT- LS-C BUILDING PEAK LOAD COMPONENTS

DIVIDE INTO ZONES; ADD PLENUM  
 SHOW ALL REPORTS

DOE-2.1E-001 Thu Nov 4 15:19:02 1993LDL RUN 3

WEATHER FILE- TRY CHICAGO

\*\*\* BUILDING \*\*\*

FLOOR AREA 5000 SQFT 465 SQMT  
 VOLUME 50000 CUFT 1416 CUMT

COOLING LOAD  
 -----  
 TIME AUG 19 6PM  
 DRY-BULB TEMP 90F 32C  
 WET-BULB TEMP 71F 22C

HEATING LOAD  
 -----  
 MAR 24 6AM  
 8F -13C  
 7F -14C

	SENSIBLE (KBTU/H) ( KW )		LATENT (KBTU/H) ( KW )		SENSIBLE (KBTU/H) ( KW )	
WALL CONDUCTION	4.297	1.259	0.000	0.000	-6.888	-2.018
ROOF CONDUCTION	0.000	0.000	0.000	0.000	0.000	0.000
WINDOW GLASS-FRM COND	8.963	2.626	0.000	0.000	-22.096	-6.474
WINDOW GLASS SOLAR	29.977	8.783	0.000	0.000	1.992	0.584
DOOR CONDUCTION	0.000	0.000	0.000	0.000	0.000	0.000
INTERNAL SURFACE COND	0.000	0.000	0.000	0.000	0.000	0.000
UNDERGROUND SURF COND	-1.000	-0.293	0.000	0.000	-7.750	-2.271
OCCUPANTS TO SPACE	11.607	3.401	6.776	1.985	0.026	0.008
LIGHT TO SPACE	17.920	5.251	0.000	0.000	1.079	0.316
EQUIPMENT TO SPACE	8.679	2.543	0.000	0.000	0.367	0.107
PROCESS TO SPACE	0.000	0.000	0.000	0.000	0.000	0.000
INFILTRATION	0.000	0.000	0.000	0.000	-11.157	-3.269
TOTAL	80.443	23.570	6.776	1.985	-44.428	-13.017
TOTAL LOAD	87.218 KBTU/H	25.555 KW			-44.428 KBTU/H	-13.017 KW
TOTAL LOAD / AREA	17.44BTU/H.SQFT	55.014 W /SQMT			8.86BTU/H.SQFT	28.023 W /SQMT

\* NOTE 1)THE ABOVE LOADS EXCLUDE OUTSIDE VENTILATION AIR  
 \* ---- LOADS  
 \* 2)TIMES GIVEN IN STANDARD TIME FOR THE LOCATION  
 \* IN CONSIDERATION



## REPORT LS-D

### BUILDING MONTHLY LOADS SUMMARY

This report gives a summary of monthly cooling, heating, and electrical requirements plus annual total energy requirements and maximum monthly peak loads. Unconditioned spaces (ZONE-TYPE = UNCONDITIONED or PLENUM) are not included in this report's monthly load.

Once again, you should be aware that these loads are based on a constant temperature within each SPACE (that is, no setback, no floating, and no other temperature variations within the SPACE). Additionally, these loads do not account for conditioning of outside ventilation air. Later, in SYSTEMS, these items will be accounted for.

1. COOLING, HEATING, and ELEC  
are the three sections of this building level report.
2. COOLING ENERGY  
(millions of Btu) is the monthly sensible cooling load for all SPACES in the building.
3. MAXIMUM COOLING LOAD  
(thousands of Btu/hr) is the peak sensible space cooling load. To the left of this column are the day and hour of the peak cooling load along with the outside dry-bulb and wet-bulb temperatures at the time of the peak.
4. HEATING ENERGY  
(millions of Btu) is the monthly heating load.
5. MAXIMUM HEATING LOAD  
(thousands of Btu/hr) is the peak space heating load. To the left of this column are the day and hour of the peak heating load along with the outside dry-bulb and wet-bulb temperatures at the time of the peak.
6. ELECTRICAL ENERGY (kWh)  
is the monthly electrical consumption for lights, convenience outlets, and non-HVAC equipment.
7. MAXIMUM ELEC LOAD (kW)  
is the monthly peak electrical consumption in a one-hour period for lights, convenience outlets, and miscellaneous equipment input as SOURCE.
8. TOTAL  
is the annual total for the cooling load, heating load, and electrical load of the building.
9. MAX  
is the highest monthly peak cooling load, heating load, and electrical load.

AMPLE STRUCTURE RUN 3, CHICAGO  
DESIGN-DAY SIZING OF VAV SYSTEM  
REPORT- LS-D BUILDING MONTHLY LOADS SUMMARY

DIVIDE INTO ZONES; ADD PLENUM  
SHOW ALL REPORTS

DOE-2.1E-001 Thu Nov 4 15:19:02 1993LDL RUN 3

WEATHER FILE- TRY CHICAGO

----- COOLING -----						----- HEATING -----						----- ELEC -----		
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY HR	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY HR	DRY- BULB TEMP	WET- BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC- TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)		
JAN	4.78164	25 16	48.F	42.F	49.888	-11.550	12 8	-7.F	-7.F	-44.074	2821.	11.500		
FEB	4.43467	15 16	31.F	26.F	51.672	-10.628	4 6	7.F	6.F	-44.237	2451.	11.500		
MAR	6.38896	5 17	57.F	46.F	51.477	-7.794	24 6	8.F	7.F	-44.428	2709.	11.500		
PR	12.44952	26 15	78.F	61.F	68.359	-2.422	8 6	32.F	29.F	-21.366	2810.	11.500		
MAY	15.49518	20 15	77.F	68.F	68.505	-1.047	6 5	39.F	35.F	-12.132	2821.	11.500		
JUN	19.14147	20 15	90.F	77.F	75.856	-0.233	23 5	52.F	48.F	-5.822	2585.	11.500		
JUL	24.68539	9 15	94.F	74.F	80.255	-0.006	1 1	63.F	54.F	-0.240	2821.	11.500		
AUG	22.43433	19 17	90.F	71.F	80.443	-0.009	5 5	55.F	54.F	-2.692	2821.	11.500		
SEP	16.82664	26 16	82.F	61.F	77.270	-0.537	22 6	35.F	31.F	-12.155	2585.	11.500		
OCT	13.10616	10 16	68.F	53.F	71.816	-1.883	21 6	30.F	29.F	-17.395	2821.	11.500		
NOV	6.53109	8 15	60.F	49.F	66.382	-6.602	15 6	28.F	26.F	-28.497	2473.	11.500		
DEC	4.46447	10 15	41.F	35.F	52.291	-10.857	8 20	18.F	16.F	-37.581	2709.	11.500		
TOTAL	150.740					-53.568					32429.			
MAX					80.443					-44.428		11.500		